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Growing an Application from Collaboration to Management Support

Gerhard Schwabe, University of Zurich

Analysis and Design

Just like in other towns, members of the Stuttgart city council have a large workload: In addition to their primary profession (e.g. as an engineer at Daimler Benz) they devote more than 40 hours a week to local politics. This extra work has to be done under fairly unfavorable conditions. Only council sessions and party meetings take place in the city hall; the deputies of the local council do not have an office in the city hall to prepare or coordinate their work. This means, for example, that they have to read and file all official documents at home. In a city with more than 500.000 inhabitants they receive a very large number of documents. Furthermore, council members feel that they could be better informed by the administration and better use could be made of their time. Therefore Hohenheim University and partners* launched the Cuparla project to improve the information access and collaboration of council members.

A detailed analysis of their work revealed the following characteristics of council work:

- Since council members are very mobile support has to be available to them any time and in any place.
- Council members collaborate and behave differently in different contexts: While they act informally and rather open in the context of their own party, they behave more controlled and formal in official council sessions.
- A closer investigation of council work reveals a low degree of process structure. Every council member has the right of initiative and can inform and involve other members and members of the administration in any order.
- Council members rarely are power computer users. Computer support for them has to be very straight forward and intuitive to use.

When designing computer support we initially had to decide on the basic orientation of our software. We soon abandoned a workflow model as there are merely a few steps and there is little order in the collaboration of local politicians. Imposing a new structure into this situation would have been too restrictive for the council members. We then turned to pure document-orientation, imposing no structure at all on the council members work. We created a single large database with all the documents any member of the city council ever needs. However, working with this database turned out to be too complex for the council members. In addition, they need to control the access to certain documents at all stages of the decision-making process. For example, a party may not want to reveal its proposals to other parties before it has officially been brought up in the city council. Controlling access to each document individually and changing the access control list was not feasible.

Therefore, the working context was chosen as a basis of our design. Each working context of a council member can be symbolized by a „room“. A private office corresponds to the council

* The project partners were: Hohenheim University (Coordinator), Datenzentrale Baden-Württemberg and GroupVision Softwaresysteme GmbH. The project was funded as part of its R&D program by DeTeBerkom GmbH, a 100% subsidiary of German Telekom.

member working at home; there is a party room, where he collaborates with his party colleagues, and a committee room symbolises the place for committee meetings. In addition, there is a room for working groups, a private post office and a library for filed information. All rooms hence have an electronic equivalent in the Cuparla software. When a council member opens the Cuparla software, he sees all the rooms from the entrance hall (figure 1).



Figure 1: Entrance Hall

The council member creates a document in one room (e.g. his private office) and then shares it with other council members in other rooms. If he moves a document into the room of his party, he shares it with his party colleagues, if he hands it on to the administration, he shares it with the mayors, administration officials and all council members etc.

The interface of the electronic rooms resembles the setup of the original rooms. Figure 2 shows the example of the room for a parliamentary party. On the left hand side of the screen there are document locations, whereas, on the right hand side, the documents of the selected location are presented. Documents that are currently worked on are displayed on the 'desk'. These documents have the connotation that they need to be worked on without an additional outside trigger. If a document is in the files, it belongs to a topic that is still on the political agenda. However, a trigger is necessary to move it out of the shelf. If a topic is not on the political agenda any more, all documents belonging to it are moved to the archive.

The other locations support the collaboration within the party. The conference desk contains all documents for the next (weekly) party meeting. Any council member of the party can put

documents there. When a council member gets prepared for the meeting, he or she merely has to check the conference desk for relevant information. The mailbox for the chairman contains all documents that the chairman needs to decide on. In contrast to his Email account all members have access to the mailbox. Double work is avoided as every council member is aware of the chairman's agenda. The mailbox of the assistant contains tasks for the party assistants, the mailbox for the secretary assignments for the secretary (e.g. a draft for a letter). The inbox contains documents that have been moved from other rooms into this room.

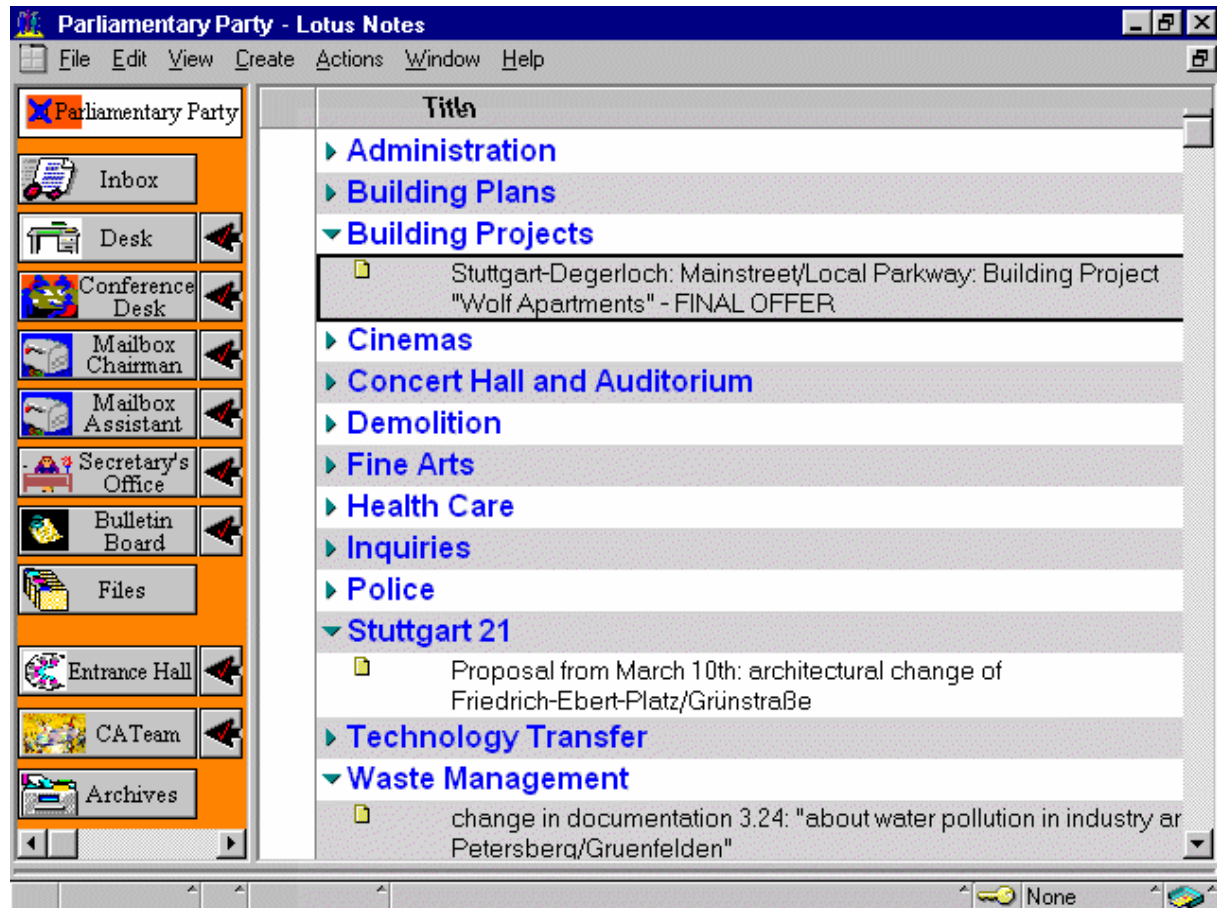


Figure 2: Parliamentary Party Room

Thus, in the electronic room all locations correspond to the current manual situation. Council members do not have to relearn their work. Instead, they collaborate in the shared environment they are accustomed to with shared expectations on the other peoples' behaviour.

Some specific design features make the software easy to use. The software on purpose does not have a fancy 3D-interface that has the same look as a real room. Buttons (in the entrance hall) and lists (in the rooms) are much easier to use and do not distract the user from the essential parts. Each location (e.g. the desk) has a little arrow. If a user clicks on this arrow, a document is moved to the location. This operation is much easier for a beginner than proceeding by 'drag and drop'.

Furthermore, software design is not restricted to building an electronic equivalent of a manual situation. If one wants to truly benefit from the opportunities of electronic collaboration support systems, one has to include new tools, that are not possible in the manual setting. For

example, additional cross location and room search features are needed to make it easy for the council member to retrieve information. The challenge of interface design is to give the user a starting point that is close to the situation he is used to. A next step is to provide the user with options to improve and adjust his working behavior to the opportunities offered by the use of a computer.

Organizational implementation

Building the appropriate software is only one success factor for a groupware project. Organizational implementation typically is at least as difficult. Groupware often has a free rider problem: All want to gain the benefit and nobody wants to do the work. Furthermore many features are only beneficial, if all participate actively. For example, if a significant part of a council faction insists on using paper documents for their work, providing and sharing electronic documents actually means additional work for the others. This can easily lead to the situation that groupware usage never really gets started. To "bootstrap" usage we started with the (socially) simple activities and ended with the (socially) complex activities. (figure 3).

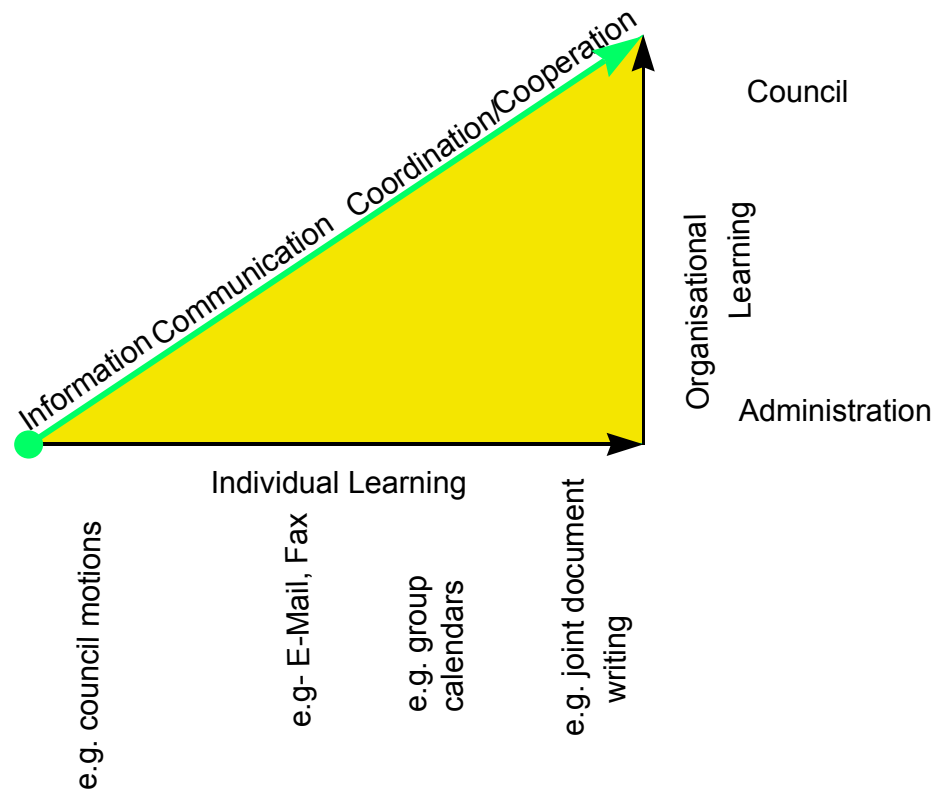


Figure 3: Steps of groupware implementation

In the first step we provided the basic council information in digital form. The city council has the power to demand this initial organizational learning process from the administration. Once there is sufficient information the individual council member can already benefit from the system without relying on the usage of his fellow councillors. The usage conventions are therefore socially simple. As better information is a competitive advantage for a council member there was an incentive for the individual learning effort required to learn using the system. Communication support (E-Mail, Fax) is a more complex process, because its success depends on reliable usage patterns by all communication partners. The usage patterns are

straight forward and easy to learn. We therefore implemented them in a second phase. Coordination activities (sharing to-do-lists, sharing calendars) and cooperation activities (sharing documents and room locations, electronic meetings) depend on the observance of socially complex usage conventions by all group members. For example, the council member had to learn that her activities had effects on the documents and containers of all others and that "surprises" typically resulted from ill-coordinated activities of several group members. The council has to go through an intensive organizational learning process to benefit from the features. For example, the party's business processes had to be reorganized.

We offered collaboration and coordination support in the same phase to the council members. Their appropriation depended on the party's culture: A hierarchically organized party preferred to use the coordination features and requested to turn off many collaborative features. In another party most councillors had equal rights. This party preferred the collaborative features.

Economic benefits

The ultimate success of any IS-project is not determined by the quality of the developed technology but by its economic benefits. Thus, the economic benefit of Cuparla was evaluated in the first quarter of 1998 after about 4 months of use by the whole city council (pilot user had been using the system for more than a year). Evaluating the economic benefits of an innovative software is notoriously difficult. Reasons for that include:

1. It is difficult to attribute costs to a single project. For example, the city of Stuttgart had to wire part of their city hall for Cuparla –is this a cost of the project? And how about the servers bought for Cuparla and co-used for other purposes? And how about the cost for the information that was collected for the city council and is now being used in the administration's intranet?
2. Many benefits cannot be quantified in monetary terms. For instance, how much is it worth if the council members make better informed decisions? Or, how much is it worth if council membership becomes more attractive?
3. What is the appropriate level of aggregation for economic benefits? Should it be the cost and benefit for the individual council member? Or the parties? Or the whole city council? Or even the whole city of Stuttgart? Or should the improved processes be measured?

The evaluation of Cuparla was therefore not based on purely monetary terms; rather evaluation results were aggregated on five sets of criteria (cost, time, quality, flexibility and human situation) and four levels of aggregation (individual, group, process, organization) resulting in a 4*5 matrix (figure 3).

	Cost	Time	Quality	Flexi- bility	Human Situation
Individual					
Group					
Process					
Organi- zation					

worse a little worse unchanged/neutral a little improved improved

Figure 3: Aggregated evaluation of Cuparla (March 1998)

The trick is to attribute the effects only to the lowest possible level, e.g. if one can attribute the cost of an individual PC to an individual council member, it counts only there and not on the group level. On the other hand, a server probably can only be attributed to the group of all council members and so on. We will now briefly go through major effects:

Costs: Both on the individual and the group level costs have gone up significantly (notebooks, ISDN, printer, server etc.) . There is a potential for cost savings if the council members forgo the delivery of paper copies of the documents. There have been some additional costs on the process level, but not as much as on the two levels below. There may have been direct cost savings by the provision of electronic documents in the council related business processes, but we were not able to identify them. As the administration was reluctant to really reorganize its internal business processes, many potential cost savings could not be realized. As all costs could be attributed to the levels business process, group or individual, we noted a cost neutrality to the level "organization" (the cost for provisionally wiring the city hall were negligible)

Time: During the pilot phase, the system did not save time for the councilors; to the contrary, the individual councilors had to work longer in order to learn how to use the Cuparla system. However, the councilors also indicated that they used their time more productively, i.e. the over-time was well invested. Thus, we decided to summarize the effects on the individual level as 'neutral'. Cuparla had also not yet lead to faster or more efficient decisions in the council or its subgroups. Therefore the effects are graded 'unchanged'. The council members see a potential here, but the speed of decisions is not only a matter of work efficiency but also has a political dimension and politics does not change that fast. Some business processes were rated as being faster, particularly the processes at the interface between council and administration (e.g. the process of writing the meeting minutes). There was no effect on the organization as a whole, i.e. the city of Stuttgart was not faster at reacting to external challenges and opportunities.

Quality: The council members reported a remarkable improvement of quality of their work. The council members feel that the quality of their decisions has been improved by the much better access to information. The work of the parties has benefited from the E-Mail and the collaboration features of Cuparla as well as the computer support of strategic party meetings. As the interface between different sub-processes of council work has fewer media changes

and the (partially erroneous) duplication of information has been reduced, the council members and members of the administration also reported an improved quality of their business processes. The creation of an organization-wide database of council related information even contributed to a somewhat better work in the whole administration.

Flexibility: Improved individual flexibility was reported the most important benefit of Cuparla. This holds true for spatial, temporal and interpersonal flexibility. People can work and access other people any place and any time they want. On the group level Cuparla has enhanced the flexibility within parties as it has become easier to coordinate the actions of the council members. There have not been any significant changes to the flexibility on the process or organizational level.

Human situation: Cuparla has made council membership more attractive because it has become easier to reconcile the primary job, council work and the private life. Furthermore Cuparla is regarded as an opportunity for the council member's individual development. There were no significant changes to the human situation on the group, process or organizational level.

(* Here is the end of the old version of the case study *)

Towards a Management Support System

As mentioned above, these effects were measured after a relatively short period of usage. In 2002 the author returned to Stuttgart and investigated how Cuparla had been adopted five years after the initial implementation: Cuparla has become an indispensable part of council work. Almost all council members used Cuparla frequently. Interestingly, some original features of Cuparla were only adopted years after the original software implementation, most important the rooms for subgroup collaboration.

Although the change slowed down after the initial organizational implementation phase, the system continued to grow due to user demand and organizational change:

- 1.) The user population increased significantly: While in the beginning, only members of the city council and selected members from the city administration could use the system, soon other groups demanded access. Most importantly, the district councils benefited from improved information (the city of Stuttgart consists of 23 districts). Most local decisions are first prepared in the district council and on the basis of their recommendation the city council makes a final decision. Traditionally the district councils complained about lack of information both as a basis for their decisions and of the outcome of their initiatives. Many council documents are now even available in the Internet.
- 2.) The volume of data increased significantly. By 2001 the databases were so large that older council documents were only available through online database access; only the newer documents were replicated to the notebooks of the council members (giving them the flexibility to really work any time and any place). Furthermore access to statistical data and to the City Intranet increased the information basis.
- 3) The functionality was enhanced. Here surprisingly simple solutions turned out to be surprisingly successful. As in most other German cities the Stuttgart administration was

sometimes lazy in working on council motions. Council members even suspected the administration to purposefully wait on difficult motions hoping that the council might forget. And indeed the council sometimes forgot, but as often council members remembered and became angry. This behaviour led to distrust between council and administration and to frequent unfruitful discussions in council meetings. It was therefore decided to implement a shared “open motions” list. Any council motion was put in there and the progress of the administration’s dealing with the subject was noted. Within days after implementation of this open motions list, the administration had worked through the backlog of unanswered motions. There were some subtle interface issues involved in this subsystems: the open motions list is typically too long to be inspected in detail every week. Therefore a little icon at each entry indicated if the administration had done anything at all. The council members could thus browse through the list and seek for the completely “forgotten” motions. The administration reacted quickly and soon all entries had the icon indicating work in progress. However some work just consisted of the following short notice: “This motion will be dealt with later”.

Still, the open motions list was a huge success and marked the move of Cuparla from a pure Information and Cooperation Support System towards a Management Support System. In the meantime Andreas Majer, the local project manager of Cuparla, had been promoted to head the IT department. He decided to further develop the concepts of Cuparla into a Management Support System (MSS), mainly for two reasons:

1. A MSS system could further increase the decision making power of the local decision makers.
2. Building an MSS would give his IT department (with more than 50 IT-specialists) a shared focus and could lead the way towards the integration of application as diverse as ERP-Systems, statistical information systems and geographical information systems.

Andreas Majer uses an example to describe his vision of an MSS: “Imagine a city councilor wants to analyze the success of a program providing social workers for difficult schools. Parts of the answers he will find in the official council documents dealing with the local schools. Statistical data on the schools and their neighborhoods will be provided by the statistical information system Communis and the funding for each school can be extracted from the ERP-system. The existing plans for the development of the schools are explained in the yearly planning document and the geographical situation of each school can be referenced on the digital map in the Geographic Information System. Currently, each piece of information has to be retrieved from another information system. In a Management Support System one application should suffice to provide all relevant information and the information should be linked”.

However, with the growth of the system, Cuparla reached its limits: Since its roots are a collaboration system, its interface and architecture are not sufficiently prepared for information and application integration. Therefore Stuttgart decided to start redesigning Cuparla in late 2002. The future interface will include some cockpit-functionality, allowing the each council member to monitor significant performance indicators. Furthermore, a comprehensive search functionality will support integrated queries of several information sources. The major architectural challenge will be data integration: In order to display the

relationships between data items, a data warehouse needs to be constructed. Finally, there will be several interfaces, because council members increasingly rely on PDAs and mobile phones for information access. As user needs and organizational challenges change, Cuparla will continue to grow and adapt.

Additional English literature:

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Case Study Question

1. Show how organizational issues influence the software design and how the software design effects the organizational behaviour.
2. Has Cuparla been effective? Describe the costs and the benefits from the point of view of a council member and from the point of view of a member of the administration.
3. Why has Cuparla been continuously changing? For what class of systems is this typical?
4. Design an interface and sketch out an architecture for a future Cuparla system. This system should both include collaboration and Management Support System functionality.
5. Where would you expect organizational barriers and facilitators for the implementation of such a future Cuparla System?